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THE ISTHMIAN CANAL IN ITS ECONOMIC
ASPECTS.

The Isthmian Canal Commission undertook the prosecution of three lines of investigation: (1) The engineering problems and cost of construction; (2) the nature of the political rights and corporate concessions, of which the United States must secure possession in order to construct and control an isthmian canal, and the cost of acquiring those rights; and (3) the industrial, commercial and military value of an interoceanic canal. In the report recently submitted by the Commission to the President and by him to Congress the results of each of these three inquiries are presented with full detail.

The engineering investigation made by the Commission comprises a careful study of the Nicaragua and Panama routes and an examination of the entire Isthmus of Darien east of Panama. For each of the Nicaragua and Panama routes the Commission secured all the information requisite to the preparation of detailed estimates of the costs of constructing a canal thirty-five feet in depth and with a bottom width of 150 feet. The surveys on the Isthmus of Darien showed that the Atrato routes were impracticable and that the only lines worthy of consideration—those along the San Blas and Caltonia locations—required the use of tunnels. The neces-

sity for tunnels on the Darien routes eliminated those lines from study and restricted the later engineering work of the Commission to investigations of the Nicaragua and Panama routes.

The scope of the Commission's investigation of the rights, privileges and franchises held on the American isthmus by corporations and the nature of the political privileges which the United States must necessarily secure in order to construct and control an isthmian canal are presented by Hon. Samuel Pasco in a paper published in another part of this issue of the ANNALS.

The canal from a military point of view has been discussed by Colonel Peter C. Hains, one of the military members of the Commission, in the May, 1901, issue of the ANNALS. The conclusions reached by the Commission, and published in its final report, are similar to the views set forth by Colonel Hains in his ANNALS paper.

The detailed investigation of the canal from the point of view of its industrial and commercial value to the United States and other countries is presented in one of the volumes of the Commission's report, Appendix NN. The main conclusions reached as the result of this investigation are summarized briefly in the part of the Commission's report to which the signatures of the members are attached.

After calculating carefully the advantages and disadvantages of the Nicaragua and Panama routes from an engineering point of view, and after considering the nature of, and cost of acquiring, the concessions and political rights which the United States would have to obtain in building a canal by each of the routes, and after weighing the relative commercial advantages of the two routes, the Commission reported in favor of the adoption of the Nicaragua route. As stated in the last paragraph of its final report, the conclusion of the Commission was:

"After considering all the facts developed by the investigations made by the Commission and the actual situation as it now stands,

and having in view the terms offered by the New Panama Canal Company, this commission is of the opinion that 'the most practicable and feasible route for an isthmian canal, to be under the control, management and ownership of the United States,' is that known as the Nicaragua Route."

The purpose of the present discussion is to deal in a summary and generalized manner with the relation of the canal to the industries and commerce of the United States, and to state the main facts ascertained by the investigations made to ascertain the available and prospective traffic of the proposed waterway and to determine the effects which tolls would have upon the use of the canal by the commerce of Europe and the United States with various sections of the Pacific. The study of tolls was made for the purpose not only of determining their effect upon the volume of traffic using the canal but also with the object of considering the canal in its financial aspects.

The Isthmian Canal and American Industries.

The construction of a canal across the American isthmus is proposed mainly for two reasons—that it will strengthen the efficiency of the American navy, and that it will facilitate commercial intercourse both between the eastern and western seabords of the United States and between each of those sections and those foreign countries adjacent to the Atlantic or Pacific with which, under present conditions, commerce is seriously restricted because of the great length of existing water routes. The canal will affect American industries by facilitating our foreign and domestic trade.

When we consider that our total foreign trade is second only to that of the United Kingdom and that our exports already outvalue those of that great commercial nation, that our exports of manufactures have doubled in five years and will soon amount to half a billion dollars annually, we can appreciate the growing magnitude of our foreign trade; and when we further consider that the industries which

create this great surplus for foreign trade represent the activities of but 76,000,000 people, and that our population will reach 100,000,000 by the time an Isthmian canal can be opened for commerce, the reason becomes manifest why the American people have a wide-spread and well-nigh unanimous interest in the early execution of that great work.

The costs of manufacturing iron and steel products and many other commodities are already lower in many parts of the United States than they are in Europe, and further economies in production are certain to be introduced during the coming ten or fifteen years. Having this present and prospective superiority over our greatest competitors, in the expenses of production, the future growth of our foreign trade becomes primarily and essentially a question of securing cheaper transportation. When the American manufacturer has the advantage over his competitor, both in the costs of production and in the expenses of transportation, he will surely control such foreign markets as he may require for the disposition of his products.

The two seaboard of the United States average over 13,000 nautical miles apart by the shortest ocean route—the one followed by steamers through the Straits of Magellan. Steamers take sixty days to make the voyage between New York or Philadelphia and the Pacific coast of our country, and sailing vessels require fully twice that time. The isthmian canal will shorten the ocean distances between our Eastern and Western States between 8,000 and 9,000 nautical miles, to less than 40 per cent of the length of the present routes, and will bring the countries of the eastern half of the Pacific Ocean nearer to the eastern part of the United States than to Europe.

The following detailed table shows the distances for full-powered steamers between the principal Atlantic and Pacific ports for each of the Panama and Nicaragua routes. The distances are those by arcs of great circles and by the actual

Distance from American and European Atlantic Ports to Pacific Ports, via the Nicaragua and Panama Canals.

From	Via	To Port Townsend via San Francisco.	To San Francisco.	To Guayaquil.	To Callao.	To Iquique.	To Valparaiso.	To Coronel.	1 To Yokohama via San Francisco.	1 To Shanghai via San Francisco and Yokohama.	1 To Manila via San Francisco and Yokohama.	2 To Sydney via Tahiti.	2 To Melbourne via Tahiti ³ and Sydney.	4 To Wellington via Tahiti.
New York—Nicaragua	5,696	4,921	3,246	3,751	4,393	4,628	5,161	9,457	10,507	11,207	9,676	10,251	8,716
Panama	5,696	5,299	2,864	3,359	4,021	4,650	4,838	9,855	10,885	11,585	9,852	10,427	8,892
Norfolk—Nicaragua	5,674	4,710	2,864	3,359	4,021	4,650	4,838	9,855	10,885	11,585	9,852	10,427	8,892
Panama	5,485	4,710	2,662	3,035	3,819	4,428	4,636	9,247	10,297	10,997	9,466	10,041	8,505
Charleston—Nicaragua	5,872	5,097	2,826	3,351	3,973	4,558	4,741	9,037	9,957	10,505	9,250	9,831	8,266
Panama	5,276	4,501	2,463	2,826	3,331	3,973	4,156	9,344	10,367	10,809	9,451	10,006	8,491
Fort Tampa—Nicaragua	5,673	4,898	2,463	2,826	3,331	3,973	4,156	9,344	10,367	10,809	9,451	10,006	8,491
Panama	4,753	3,978	2,303	2,668	3,450	4,035	4,218	8,514	9,564	10,264	8,733	9,308	7,773
New Orleans—Nicaragua	5,328	4,553	2,068	2,593	3,255	3,864	4,072	8,069	10,119	10,819	9,086	9,661	8,126
Panama	4,893	4,118	2,443	2,948	3,590	4,175	4,358	8,654	9,704	10,404	8,873	9,448	7,913
Calveston—Nicaragua	5,477	4,698	2,263	2,758	3,420	4,029	4,237	8,234	10,284	10,984	9,251	9,826	8,291
Panama	4,956	4,221	2,516	3,051	3,693	4,278	4,461	8,757	9,887	10,587	9,056	9,551	8,016
Liverpool—Nicaragua	5,574	4,799	2,364	2,858	3,520	4,129	4,338	8,335	10,385	11,085	9,352	9,927	8,392
Panama	5,426	4,651	2,193	2,688	3,350	3,959	4,168	8,217	10,267	10,967	9,234	9,809	8,274
Hamburg—Nicaragua	8,813	8,038	5,063	5,698	6,760	7,369	7,577	12,574	13,624	14,324	12,591	13,166	11,631
Panama	8,943	8,168	5,493	6,098	7,160	7,769	7,977	12,704	13,754	14,454	12,623	13,198	11,663
Antwerp—Nicaragua	9,242	8,467	6,032	6,637	7,189	7,798	8,006	13,003	14,053	14,753	13,020	13,595	12,060
Panama	8,664	7,889	6,214	6,719	7,361	7,946	8,129	12,425	13,475	14,175	12,644	13,219	11,684
Bordeaux—Nicaragua	8,963	8,188	5,753	6,248	6,910	7,519	7,727	12,724	13,774	14,474	12,741	13,316	11,781
Panama	8,414	7,639	5,964	6,469	7,111	7,666	7,879	12,175	13,225	13,925	12,394	12,969	11,434
Gibraltar—Nicaragua	8,713	7,938	5,593	6,098	6,660	7,269	7,477	12,474	13,524	14,224	12,491	13,066	11,471
Panama	8,148	7,373	5,668	6,203	6,845	7,430	7,613	11,909	12,959	13,659	12,128	12,703	12,800
Panama	8,447	7,672	5,237	5,723	6,394	7,003	7,211	12,268	13,258	13,958	12,225	12,800	11,265

¹ Via Honolulu adds 374 miles for Nicaragua and 252 for Panama.

² Omitting Tahiti reduces voyage from Brito by 32 miles.

³ Voyage from Brito to Sydney by Wellington is 232 miles less than by way of Tahiti, from Panama it is 465 miles less.

⁴ Voyage from Brito to Wellington direct is 185 miles shorter than via Tahiti, and from Panama it is 358 miles shorter.

routes which vessels will naturally take. It was believed that the length of commercial routes really taken by ships would be more instructive than the length of the shortest possible sailing lines between Atlantic and Pacific termini. The calculations were made for the Commission by the United States Hydrographic Office and have been twice carefully checked.

Europe is now nearer by water routes to all parts of the Pacific, than are the people of the United States, whose commercial connections are with Atlantic and Gulf ports. Even the east coast of South America, south of the Equator, is nearer to Western Europe than to the manufacturing sections of the United States. The Suez Canal has brought Europe nearer than the United States is to the East Indies, China, Japan and Oriental countries generally, and until an American canal route is opened, the manufacturers and most of the exporters of this country will find their lower costs of production largely, if not quite, offset by the greater expenses of transporting their commodities to many of their most promising markets.

A large trade with Western South America, Oceania and Asia has come to be not only advantageous but almost essential to the industries of the United States. The nitrate of soda from Chile, the cacao and the forest products from tropical America, the sugar from Hawaii, the hemp from Manila, the wool, hides and gums from Australia and New Zealand, the raw silk from Japan and China are examples of the raw materials of which large and rapidly growing quantities are required by American manufacturers. Furthermore, the countries supplying these raw materials now furnish a valuable market for machinery and manufactures, and with the development of their natural resources, and the modernization of their industrial processes and social life, their purchases will largely and continuously increase.

Although, until an isthmian canal has become available, the United States must compete for most of the Pacific trade

under great disadvantages, our present commerce with the Pacific makes no mean showing either as to volume or rate of growth. During the decade, 1890 to 1900, the value of exports to Japan, China and Asiatic Russia increased from less than twenty million to nearly seventy million dollars, and our exports to Australia, Hawaii and the Philippines from sixteen million to forty-three million dollars; the total exports to those countries having risen from \$36,157,089 to \$108,304,911, a gain of 200 per cent in ten years.

Our trade with the west coast of South America is not large, but ought to be and will become so as soon as the people of that section are able to secure our cotton goods, mining and agricultural machinery, and general manufactures directly and cheaply. Nearly one-third of the tonnage that would make use of an isthmian canal, if it were opened to-morrow, would be contributed by the trade of the western part of South America. This large commerce is now nearly all in the hands of Great Britain and Germany, but such will not long continue to be the case when ocean vessels can pass the American isthmus. Western South America is one of the few sections of the world that will always send us more tons of cargo than we shall ship to it. We require its raw materials in large quantities; it needs our manufactures. The trade will be reciprocal and highly valuable for both parties to the exchange.

Statistics of commerce are often less instructive than the experiences of men engaged in foreign trade. A New York firm, whose manufacturing plants are in New Jersey, stated in a letter to the Canal Commission: "Our business in the Sandwich Islands has been very large in the past few years,—at the rate of over one-half million dollars per year. This could undoubtedly be increased, and at the same time the sugar, and other industries, there, fostered, if we were not handicapped by the long railroad haul across the country." Thus one American firm, of whom comparatively few Americans have ever heard, is now shipping annually to little Hawaii over half a million dollars worth of goods.

The Commission received a letter from a Maryland firm stating that the firm at the time of the writing of the letter was filling a foreign order for 70,000 tons of rails for the Trans-Siberian Railway, and also an order for 30,000 tons of rails to be sent to the government of Victoria, Australia.

One Philadelphia firm shipped two full vessel cargoes of locomotives to China and Siberia in 1898. In 1899 another full cargo of engines was shipped to the same countries, and in 1900 a fourth full cargo was sent—156 locomotives sent by one Philadelphia firm to China and Siberia in a little more than two calendar years! Facts like these show the relation of the Pacific trade to the future industrial progress of the United States.

A brief reference to the manner in which the canal will affect the industries and commerce of different parts of the United States,—the Pacific slope, the Southern States, the eastern section and the central west, will reveal some of the more important relations of the waterway to the economic interests of our country.

The typical products of the Pacific slope are wheat, barley, beet sugar and hops, lumber and shingles, fruit and vegetables of many kinds, cattle, hides, and wool, and the articles obtained from the extensive river and marine fisheries,—that is to say, the west coast produces foods and the materials of industry. Some wheat flour, lumber and canned foods are sold in Oceania and trans-Pacific countries, but the largest market for all the west coast products is in Europe and the manufacturing sections of the eastern half of the United States. With the exception of the great Cordilleran Plateau, or Rocky Mountain section of our country, the Pacific coast region is the most geographically isolated portion of the United States, and will remain so until it has secured cheap water transportation to its natural markets. In spite of the great economies that have been effected during the past twenty years in the costs of moving freight by rail, the volume of bulky freight that can be profitably hauled

over high mountains to markets 2,000 to 3,000 miles distant is small. The evidence obtained by the Canal Commission on this point is extensive, and was obtained directly from shippers and railway officials.

The west coast producers are already feeling the competition of Argentine and other rival sections and are extremely desirous of securing cheaper and speedier access to the North Atlantic. The people of the Pacific States, moreover, are buyers as well as sellers, and they and the eastern manufacturers from whom they buy find the existing freight costs a heavy burden and a serious business handicap.

In order to secure information regarding the effect which the proposed waterway would have upon the industries and commerce of the southern, central-western, and eastern sections of the United States, a committee of the Isthmian Canal Commission went to most of the important seaports from Portland, Maine, to Galveston, Texas. The larger centers of the iron and steel manufactures, and such industrial cities as Cincinnati, Detroit, Indianapolis, Chicago, Milwaukee and St. Louis were also visited. Conferences were had in twenty-nine cities with the chambers of commerce or corresponding societies of business men. Special reports were prepared by the commercial organizations in these and other cities and an extensive correspondence was carried on with various classes of business men in all parts of the country. It is believed that the knowledge secured in this manner gave the committee something more than statistical or descriptive information concerning American industries. It certainly gave the committee a very strong impression of the tremendous producing capabilities of the people of this country, and of the large results that will follow the cheapening of transportation by opening a highway for commerce across the American isthmus.

Throughout American history the exports from the Southern states, the cotton, tobacco, lumber and naval stores, have constituted a large part of the tonnage of our foreign com-

merce; and latterly phosphate, coal, iron and steel, and general manufactures have made an important addition to the outbound trade of that section. Most of these commodities are bulky and require the use of a large tonnage of shipping for their transportation. The products of the South find their present foreign market mainly in Europe, but they are desired in greater or less degree by nearly all countries, those of the Pacific Ocean, as well as those of the Atlantic. Because of the geographical position of the South, its exports are largely excluded from the markets of the Pacific. The position of the South as regards Pacific trade is very similar to that of the west coast of the United States as regards its commerce with Atlantic countries.

The canal will benefit the cotton industries of the South by giving the American staple a larger and more profitable trade in the Japanese market, where there is a keen competition with East Indian cotton; and it will also greatly facilitate the exportation of cotton goods to Western South America, Asia and Oceania where Great Britain and Germany now do a large business. The Southern mills are making great progress in cotton manufacturing, over 5,000,000 spindles are now running in those mills, and it is predicted by the commercial organizations of Charleston that North and South Carolina, whose annual crop of raw cotton is about one and one-half million bales, "will within a period of five years spin more cotton than they grow." The cloth made in the South is admirably adapted to the Pacific trade, and the Southern mill owners are desirous of a short route to Pacific markets.

The iron industries of the South will send through the canal to South America, Hawaii, California and trans-Pacific countries large quantities of such articles as iron pipe, engines, mining and agricultural machinery and steel wire. One of the large iron and steel manufacturing firms of the United States, whose business, according to its reports, amounts to from \$35,000,000 to \$40,000,000 annually, says

that "It is looking forward to a large export business in the near future with the different colonies of the United States and with South America, Asia, Africa and Europe." This firm believes that the Birmingham, Alabama, district "is destined to become the principal manufacturing centre in the United States for the export trade in iron and steel." . . . "The opening of the isthmian canal would be of incalculable benefit to us in increasing our facilities for export business, and would warrant the development of our Southern property to the fullest extent. We are positive that the markets of the world can be reached and supplied with our finished product (especially from the Southern district)."

The manufacture of machinery, tools, implements and the great variety of articles made from iron and steel is carried on mainly in the states north of the Ohio and Potomac and the total effect of the canal upon the iron and steel industries will be even greater in the North than in the South. Everybody realizes that the opening up of the undeveloped countries of the Pacific Ocean will require vast amounts of iron and steel manufactures, and when a canal has been constructed the people of the United States will secure a very large share of that trade. What is now being accomplished in spite of the present high costs of transportation is but an earnest of the future.

Besides aiding the cotton and iron and steel industries of the Southern states, the canal will open up a large market for their coal, lumber, naval stores and phosphate rock. The coal will be required by the vessels using the canal, and in the coaling stations of the eastern part of the Pacific Ocean in tropical and south temperate latitudes, and also for industrial purposes along the west coast of Central and South America. This exported coal will be mined not only in Alabama, but also in the northern bituminous fields of Pennsylvania and West Virginia, which enjoy especially cheap transportation to New Orleans by the Ohio and Mississippi rivers. The Southern states now send large quantities of lumber to the

eastern coast of South America, and as soon as a canal has been opened they will ship to the west side of that continent and to other Pacific sections. The hardwood and yellow pine lumber of the South will be required in the development of the resources of the South American and other Pacific countries, and the phosphate fertilizers of Florida, South Carolina and Tennessee will be exported to Japan and to countries where agriculture is carried on by the intensive culture that goes with irrigation.

The reference previously made to the Pacific business of a New York, a Philadelphia and a Maryland firm partially illustrates the manner in which the canal will affect the industries of the eastern part of the United States. This part of the United States is intersected in the proposed waterway chiefly because it wants to get its surplus manufactures to Pacific markets and exchange them for foods and raw materials. Since the opening of the Suez Canal, Europe has had such an advantage over our Eastern States in reaching Pacific markets that American manufacturers located in or having rail connections with our Atlantic seaports, find difficulty in competing with their trans-Atlantic rivals for the trade of Australia, Oceania, and the Orient. The Philadelphia Board of Trade and Maritime Exchange state in a joint report which they prepared for the Isthmian Canal Commission, that the canal will assist "our Philadelphia merchants to enter into more effective competition with the nations of Europe which are now enabled to underbid us in the far east, by reason of the more economical and expeditious transportation which their merchants enjoy by the Suez Canal Route." What is true of Philadelphia is true of the other manufacturing or commercial centers in the Eastern States.

Information, in considerable detail, regarding the present trade of the central west with Pacific markets was secured for the Commission by commercial organizations in Cleveland, Cincinnati, Indianapolis, Chicago and St. Louis. In

each of these cities the leading association of business men addressed to its members a letter of inquiry regarding the nature and the volume of the commodities imported and exported, the routes now employed, and the manner in which an isthmian canal would affect the routes of shipment and the development of trade. The replies received showed the existence of a large exportation of manufactures from the central part of the United States to Pacific countries. American manufacturing activities are rapidly spreading throughout the central states and the business men of that section are hardly less interested in securing ready connection with the Pacific than are the men whose plants are located nearer tide water.

A brief reference, taken from Appendix NN of the Commission's final report, to the information received from Chicago will illustrate the relation of the canal to the central west generally.

In the city of Chicago a great variety of manufacturing industries is carried on, and shipments are made to all the countries of the Pacific. Railway materials and mining and agricultural machinery, however, are especially important, mining machinery being sent to all parts of the world, wherever mining operations are carried on. The foreign trade of one Chicago firm engaged in the manufacture of mining machinery amounts to 15,000 tons annually. The agricultural machinery manufactured in and about Chicago is now shipped to the west coast of South America, to Eastern Siberia, and to various parts of Australasia. The Australasian trade of one firm in 1900 amounted to 11,000 tons. The shipments of this firm and presumably of others of that part of the country are made by way of New York, except on rare occasions, when, for the purpose of economizing time, the goods are routed by way of San Francisco or Vancouver. The rates from New York are usually much lower than those by way of the Pacific Coast. The time taken to get goods from Chicago to Australia varies from sixty-five to eighty-

five days, ten days of that time being required for getting the goods to New York City. The average time from Chicago to the Pacific Coast is eighteen days, and steamers from our Pacific Coast to Australasia take from twenty-two to twenty-eight days for the passage. The canal will shorten the distance by water from our Atlantic seaboard to Australasia by approximately 4,000 miles, and the distance to South America more than twice that number of miles.

The Canal and Shipbuilding.

The effect of the canal upon the business of building ships is worthy of special consideration. The canal is to be a highway for ocean commerce, and the results of the construction of the waterway will be felt first of all in the shipyards and merchant marine of this country. Information was received by the Canal Commission from forty American firms engaged in the building and operating of ships concerning the effect which the canal will have upon their business. The canal will unquestionably enlarge the coasting trade between the two seabords of the United States and will cause a larger number of steamers to be built in American yards. Some of the vessels now employed in our coasting commerce will use the new waterway, but most of the ships for the trade between our two seabords will consist of large freight steamers of modern design specially constructed for the trade. The evidence secured regarding the cost of building vessels seems to indicate that the enhanced demand for coasting vessels, together with the declining costs of material and the economies constantly being made in the labor expenses of construction, will during the next five or ten years enable Americans to build ships as cheaply as they can be launched on the Clyde.

The ownership and operation of ocean vessels by the large industrial firms as a part of their business, which has now in many cases come to include the entire process of obtaining

the raw materials, converting them into usable commodities and placing them in the hands of the consumer, whether foreign or domestic, will, to some extent, solve the question of our securing a larger merchant marine owned by Americans. Whether these vessels owned by American producers will be sailed under our flag, or under that of some foreign nation, will be determined by forces over which the isthmian canal will have but slight influence.¹

Some of the vessels employed in the commerce between our eastern seaboard and trans-Pacific countries will doubtless desire to participate in the interoceanic coasting trade of the United States, and in order to do so they will need to have the American registry. The action of Congress in restricting the commerce of Porto Rico and Hawaii with the United States to American ships suggests that our trade with the Philippines may also be limited to the vessels flying our flag. Should Congress take such action regarding the Philippines, a considerable share of the commerce of our Atlantic and Gulf ports with Japan and China will be carried in American vessels, because such ships would be able to participate in both our Philippine and foreign trade.

Any benefit conferred upon our shipbuilding industry will indirectly aid in the enlargement of the tonnage of American vessels engaged in the foreign trade of the United States. If the American purchaser could secure vessels at home as cheaply as in foreign yards one of the present reasons for registering his ships under the flag of some other nation would be removed. The future growth of the merchant marine under the flag of the United States will depend on numerous factors, some economic and some political. The construction of the isthmian canal will apparently affect that growth favorably.

¹ This and the two following paragraphs are taken from Chapter VIII, Appendix NN, of the Commission's final report.

The Canal and Railway Traffic.

The effect of the canal on the traffic of American railways is a question concerning which much has been said in all discussions of the isthmian waterway, and an endeavor was made by the writer to secure from shippers in different parts of the country and from the traffic officials of the railways as much information as possible on this important subject. As to the business of the railway systems in the territory between Chicago and New York and of those in the Southern states, the evidence is practically unanimous that the canal will be beneficial. As regards the effect of the new water route upon the railroads west of the Mississippi River the testimony is divided. That the canal will be a rate-controlling factor of wide-reaching importance is generally admitted, and naturally enough is feared by those railway officials who do not think the waterway will bring much new and compensating business to the railroads. Here is the crux of this question, will the canal make business for the trans-continental railroads? Some of the trans-continental officials say yes and some say no; but the experience of history has always been that the improvements in facilities for water transportation have resulted in the diversification and distribution of industry and added to the volume of business done. Some of the railway officials with whom I have conferred believe that this experience will be repeated by the opening of the isthmian waterway. A well-known president of one of the western roads expressed this thought clearly and concisely in his reply to the Commission's inquiry: "In a general way, my idea has been, and is, that the construction of the canal would be beneficial to the Mississippi valley, as well as to the Pacific coast. I incline to think cheaper transportation for heavy freights between the Mississippi valley and the coast would so increase general business that the railroads would get back, out of high-class freights and passengers,

more than they would lose by the loss of low-class traffic where time is not important."

Having outlined the relation of the canal to our industries and our shipping and transportation interests, there remain the questions of traffic and tolls to be considered.¹

Tonnage of Available Canal Traffic, 1899.

A detailed study of the foreign commerce of the United States for the year ending June 30, 1899, and of the commerce of Europe with the western part of the American continents during the calendar year 1899, has been made to ascertain the tons of cargo or *freight* and the net register tonnage of the *vessels* that might have passed through an isthmian canal had one been in existence. The cargo tonnage was found to amount to 6,703,608. This total does not include the comparatively small amount of freight that passed by water between our two seaboard, the statistics of which are not obtainable. It comprises 1,807,365 tons for the commerce between the eastern seaboard of the United States and Australasia, Oceania, Japan, China and Siberia; 1,629,387 tons for the trade between the west coast of the United States and Europe; and 3,266,856 for the commerce between Europe and western South and Central America, Western Mexico, Hawaii and British Columbia. It does not include any of Europe's trade with other parts of the Pacific.

The tonnage of the vessels that might have used an isthmian canal in 1899 was ascertained by an examination of the statistics of entrances and clearances kept by the United States and European countries. The vessel movements connected with the commerce of the eastern seaboard of the United States with Pacific America and with Australia, Oceania, the Philippines, Japan, China and Siberia, and

¹ The remainder of this paper is taken from the summary of the industrial and commercial value of the canal contained in the final report of the Isthmian Canal Commission.

the vessel movements between the western coasts of the American continents and the North Atlantic American and European ports were found to amount to 4,074,852 *vessel tons net* register, including 336,998 tons, for the commerce now crossing the Isthmus of Panama.

This total was compared with the result of a traffic investigation made by the New Panama Canal Company. The records of vessel movements kept by that company show a traffic for the calendar year 1899 of 3,848,577 tons net register for the commerce between Europe and the western coast of the American continent, between the Atlantic seaboard of America and trans-Pacific countries, and between the two American seaboards. The total obtained from the records kept by the Panama Company does not include any vessel tonnage for the commerce now crossing the isthmus. The addition of that tonnage, 336,998 tons, raises the total to 4,185,575.

In addition to this tonnage, which comprises only traffic originating or terminating in America, there should be included most of the commerce of Europe with New Zealand and the other islands of the Pacific east of Australia. New Zealand will be 1,503 miles nearer Liverpool by the Nicaragua Canal than via the Suez route, and 2,407 miles nearer than by the way of Good Hope. The distances to Liverpool from the most important groups of South Pacific islands north of New Zealand will be from 500 to 5,500 miles less via the isthmian canal than by way of Suez. The entrances and clearances of New Zealand's trade with Northwestern Europe—France and countries farther north—amounted to 481,178 tons net registered in 1899, and the commerce of that part of Europe with the other islands of the South Pacific east of Australia to 181,743 tons. Of this total traffic of 662,921 tons, not less than 500,000 might have advantageously used an isthmian canal, and this amount should be added to the tonnage of the canal traffic originating or terminating in America. This makes the

total obtained by the commission's investigation of the tonnage that might have used an isthmian canal in 1899, 4,574,852 tons net register; and the total obtained by adopting the New Panama Canal Company's figures for the traffic originating or terminating in America, 4,685,575 tons.

The above totals for the tonnage that might have used an isthmian canal in 1899 do not include any of Europe's trade with Australia and Japan, a part of which, for reasons stated above, would have used an isthmian waterway. The distances from Great Britain to Sidney and Yokohama by the Suez and isthmian canal routes are approximately equal, and vessels going by America in either direction en route between Europe and Japan or Australia will pass regions from which there is a heavy export tonnage. If it be assumed that only ten per cent of the vessel tonnage of the Australian trade with the ports of Northwestern Europe, and only five per cent of the tonnage of the Japanese commerce with those ports would have taken an American canal route, the totals for 1899 should be increased 316,223 tons, and be raised from 4,574,852 to 4,891,075 tons, and from 4,685,575 to 5,001,798 tons, or to approximately 5,000,000 tons.

Growth of Traffic—Probable Tonnage in 1914 and 1924.

Tables prepared by the New Panama Canal Company show that the vessel tonnage of the commerce between Europe and Pacific America, and between the Atlantic seaboard of America and the eastern and western sides of the Pacific, increased 25.1 per cent during the decade 1888-1898, and this rate has been adopted in estimating the traffic that will be available for the isthmian canal in 1914, by which year it is assumed that the waterway will have been completed and put in operation. This rate of increase would raise the available traffic of 1899, obtained by adding to the New Panama Canal Company's figures for tonnage originating and

terminating in America the present traffic across the Isthmus of Panama and 500,000 tons of the commerce of New Zealand and other south Pacific islands with Europe—4,685,575 tons—to 5,861,127 tons in 1909 and to 6,555,670 tons in 1914. A growth of 25.1 per cent per decade would increase the total of 4,574,852 tons for 1899, obtained by the Commission's investigation of the statistics of entrances and clearances, to 5,723,150 tons in 1909 and 6,401,343 tons in 1914—the tonnage being net register in each case.

In all probability the future increase in that part of the world's commerce that would use an isthmian canal will be more rapid than the past growth has been, because in the Pacific countries of America, in Australasia and in the Orient, the industrial progress of the next two decades promises to be much greater than that of the past twenty years has been. The rate of increase, 25.1 per cent per decade, prior to the opening of the canal probably undervalues what will occur. It is certainly a conservative estimate.

While it is not to be expected that the traffic of the isthmian waterway during the earlier years of its operation will increase so rapidly as did the tonnage passing the Suez Canal; the growth in the commerce using the Suez route constitutes the best basis for estimates regarding the rate of increase in the tonnage of the commerce that will use the American canal. The growth in the traffic of the Suez Canal is shown by the table on following page, in which the tonnage total for each five-year period is given.

The tonnage of the second five-year period was 205 per cent that of the first, and the total for the third period 217 per cent that of the second. The traffic in 1880 was 3,057,422 tons, that of 1890, 6,890,094, an increase of 125 per cent; and that of 1900, 9,738,152 tons, a growth of 2,848,058 tons, or 41 per cent during the past decade. The initial tonnage of the Suez Canal was small and the rate of increase during the first decade was large. Should 1914 be the first year of the operation of the American canal, and the rate of

Increase in the Number of Vessels and Tonnage of the Suez Canal by Quinquennial Periods.

Years.	Number of Vessels.	Net Tonnage.	Per Cent Increase.	Percentage which the tonnage of each five-year period is of the tonnage of 1875-1879.
1870-1874 . .	4,770	5,358,237
1875-1879 . .	7,684	10,995,214	105	. .
1880-1884 . .	14,542	23,916,374	117	217
1885-1889 . .	16,726	31,430,454	31	286
1890-1894 . .	17,848	39,899,143	27	363
1895-1899 . .	16,939	44,042,274	10	401

increase in the traffic during the first ten years be 62½ per cent—half that of the Suez waterway during the second decade of its use—the estimated tonnage at the beginning, in round numbers 6,500,000 tons net register, would be raised to approximately 10,500,000 tons in 1924.

Tolls and Traffic.

The extent to which the isthmian canal is used will depend in part upon the tolls charged. The commerce of western South America with Europe will continue to pass the Straits of Magellan or to round Cape Horn; the trade of the American Atlantic seaboard with Australia will keep to the Good Hope route, and the traffic between our eastern seaboard and the Philippines and southern China will remain tributary to the Suez route, if the charges for passing the American canal are made greater than the saving to be effected by using that waterway. A toll of about one dollar per ton net register could profitably be paid by the commerce between Europe and western South America, and by that of our eastern seaboard with Australia; but in both instances a much higher charge would probably cause a large share of

the business to continue to be done by the routes now used. For the commerce of our eastern ports with the Philippines and the mainland of Asia between Singapore and Shanghai the distances by way of the Suez and isthmian canals will be so nearly equal that the route chosen will depend largely upon tolls. Light charges at the American canal will give that waterway a large share of the tonnage; high tolls will cause the Suez route to be used.

The Suez tolls at the present time are nine francs per ton net register, "Danube" measurement; and this charge amounts to somewhat more than \$2 per ton net register, British or American measurement. The Suez tolls are levied by a private corporation, whose object is to secure the maximum revenue obtainable. With the exception of the trade between Europe and Australia, the commerce served by the Suez Canal can be charged a high toll without much restricting the tonnage using the waterway; consequently a large reduction in charges would not be compensated for by the increase in traffic and the revenue would be less. It is not probable that the Suez Canal Company would find it profitable to reduce its tolls largely for the purpose of competing with the American waterway.

In fixing the charges for the use of an isthmian canal, owned and operated by the United States Government, the principle of maximum revenue could not wisely be followed. The revenue-producing function of the canal will be a minor one as compared with its services in promoting the industrial and commercial progress and general welfare of the United States. The exaction of tolls that would much restrict the benefits derivable from the canal would not be to the advantage of the American people.

An annual traffic of 7,000,000 tons, at \$1 per ton, will produce a revenue of \$7,000,000. The expenses of operating and maintaining the Panama Canal are estimated at about \$2,000,000 per annum, and those of the Nicaragua Canal at about \$3,350,000. Upon this basis the net revenue by either

route would not be sufficient, at the opening of the canal, to pay interest upon the capital invested and compensate a private corporation for the risks involved. It is the opinion of the Commission, however, that there are other considerations more important than revenue. It may even be expedient for the United States to reduce the tolls to an amount which will barely cover the expenses of operation and maintenance. A large increase of traffic in the future is probable, and the revenue producing value of the canal would then be proportionately greater.

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